According to Mean Value Theorem of Integrals, if a function $f(x)$ is continuous on $[a,b]$, then there is a point say $x = c \in [a,b]$ such that:

$f(c) = \textit{Average value of Function in } [a,b] = \frac{1}{b-a}\int_a^b f(x)dx.$

So here, we are to require to find that value $x = c$ at which we can obtain the average value of function.

Here, it is given that $f(x) = x^2$ and $[a,b] = [1,4]$

$\therefore f(c) = \frac{1}{b-a}\int_a^b f(x)dx. = \frac{1}{4-1}\int_1^4 x^2dx = \frac{1}{3}\left|\frac{x^3}{3}\right|_1^4 = \frac{1}{9}\left(4^3 - 1^3\right)$

$\Longrightarrow c^2 = \frac{1}{9}(64-1) = \frac{1}{9}(63) = 5$

$\Longrightarrow c = \pm\sqrt{5}$

Since $c \in [1,4]$

$\Longrightarrow c$ is positive.

$\therefore \boxed{c = \sqrt{5}}$